



U.S. Army Corps of Engineers  
Southwest IMA Region

***DRAFT FINAL***

**Site Inspection Report  
Clovis Air Force Base  
Precision Bombing Range No. 1  
Lea County, New Mexico**

*FUDS Project No. K06NM037400  
March 2007*

*In Support of*  
**FUDS MMRP Site Inspections Project**

*Prepared by*

**PARSONS**

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Norcross, Georgia 30092

*Prepared for*

U.S. Army Corps of Engineers, Albuquerque District  
4101 Jefferson Plaza NE  
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and

U.S. Army Corps of Engineers  
South Pacific Division Range Support Center

**Contract No. W912DY-04-D-0005  
Task Order 0009  
Project No. 744653**

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

March 8, 2007

U.S. Army Corps of Engineers, Albuquerque District  
ATTN: CESPAC-EC-G (Ms. Lara Beasley)  
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Subject: Contract W912DY-04-D-0005, Delivery Order 0009  
MMRP SI for SW IMA Region – Draft Final Site Inspection Report  
Clovis AFB PBR No. 1, Lea County, New Mexico

Dear Ms. Beasley:

Parsons has prepared this Draft Final Site Inspection Report for the Clovis AFB PBR No. 1 site. Five copies have been provided for your review and comment. Three additional copies have been included for your distribution to the key stakeholders (NMED and EPA). We have simultaneously forwarded copies to Monique Ostermann, the MM CX, and HTRW CX. Electronic copies have also been provided.

If you have any questions or comments, please contact me at (303) 764-1927 or the Program Manager (Mr. Don Silkebakken) at (678) 969-2384.

Sincerely,

**PARSONS**



Greg Van  
SI Task Manager

cc: SPD Monique Ostermann – 1 copy / 3 CDs  
MM CX Betina Johnson / Deborah Walker – 1 copy / 2 CDs  
HTRW CX Heidi Novotny – 1 copy / 2 CDs  
Laura Kelley (Parsons DPM – Project File 744653.34000)





**U.S. Army Corps of Engineers**

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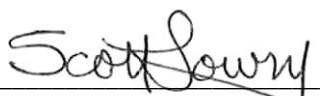
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**Project No. 744653**

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Greg Van, Task Manager

  
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Scott Lowry, QC Reviewer



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**ACRONYMS AND ABBREVIATIONS**

AFB	Air Force Base
amsl	above mean sea level
ASR	archives search report
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSEM	conceptual site exposure model
CSM	conceptual site model
CZMP	Coastal Zone Management Program
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DQO	data quality objective
EPA	Environmental Protection Agency
ER	Engineer Regulation
FUDS	Formerly Used Defense Site
GPS	global positioning system
HRS	Hazard Ranking System
HTW	hazardous and toxic waste
INPR	inventory project report
MC	munitions constituent
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	munition response site
MRSP	Munitions Response Site Prioritization Protocol
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	no Department of Defense action indicated
NHA	National Heritage Area
NHL	National Historic Landmark
NHNM	Natural Heritage New Mexico
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
No.	Number
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHD	National Register Historic District
NRHP	National Register of Historic Places
NRIS	National Register Information System
NWI	National Wetlands Inventory
NWRS	National Wildlife Refuge System
OSE	Office of the State Engineer

**ACRONYMS AND ABBREVIATIONS (CONTINUED)**

PA	preliminary assessment
Parsons	Parsons Corporation
PBR	precision bombing range
PSAP	programmatic sampling and analysis plan
PWP	programmatic work plan
QC	quality control
QR	qualitative reconnaissance
RI/FS	remedial investigation and feasibility study
RMIS	Risk Management Information System
ROE	right of entry
SI	site inspection
SS-WP	site-specific work plan
T&E	threatened and endangered
TESS	Threatened and Endangered Species System
TPP	technical project planning
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance
WATERS	Water Administration Technical Engineering Resource System
WRCC	Western Regional Climate Center

**GLOSSARY OF TERMS**

<b>anomaly</b>	Any item that deviates from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.).
<b>magnetometer</b>	An instrument for measuring the strength of a magnetic field; used to detect buried iron and other metal objects.
<b>military munitions</b>	All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof.
<b>munitions and explosives of concern (MEC)</b>	Military munitions that may pose unique explosives safety risks, including unexploded ordnance (UXO), discarded military munitions, or munitions constituents present in high enough concentrations to pose an explosive or other health hazard.
<b>munitions constituents (MC)</b>	Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.
<b>munitions debris</b>	Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.
<b>munitions response</b>	Response actions, including investigation, removal actions, and remedial actions, to address the explosive safety, human health, or environmental risks presented by unexploded ordnance, discarded military munitions, or munitions constituents, or to support a determination that no removal or remedial action is required.
<b>munitions response site (MRS)</b>	A discrete location within a munitions response area that is known to require a munitions response.



**GLOSSARY OF TERMS (Continued)**

<b>projectile</b>	Object projected by an applied force and continuing in motion by its own inertia. This includes bullets, bombs, shells, grenades, guided missiles, and rockets.
<b>unexploded ordnance (UXO)</b>	Military munitions that have been primed, fuzed, armed, or otherwise prepared for action; that have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and that remain unexploded whether by malfunction, design, or any other cause.

## **EXECUTIVE SUMMARY**

### **PROJECT OBJECTIVES**

The objective of this site inspection (SI) is to determine whether Clovis Air Force Base (AFB) Precision Bombing Range (PBR) Number (No.) 1 in Lea County, New Mexico warrants further investigation. Historical evidence indicates that Clovis AFB PBR No. 1 was never used as a bombing range. The technical project planning (TPP) team determined that completing a qualitative reconnaissance (QR) would be sufficient to meet the SI objective. The SI was completed by performing a QR to support a systematic justification for a no Department of Defense action indicated (NDAI) determination.

### **SUMMARY OF RESULTS**

The SI evaluation included performing approximately 5.8 miles of walked QR on November 30, 2006. Munitions and explosives of concern (MEC) and munitions debris were not found during the QR, and none of the 28 QR observations indicated the presence of subsurface anomalies.

There are no known releases of MC to groundwater or soil at Clovis AFB PBR No. 1, and available information indicates that this site was never used as a bombing range or for any other purpose involving munitions. Therefore, there is no source of MEC/MC and a completed exposure pathway does not exist for human and/or ecological receptors.

### **RECOMMENDATIONS**

Clovis AFB PBR No. 1 is recommended for an NDAI determination.

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

1.1.1 Parsons Corporation (Parsons) received Contract Number (No.) W912DY-04-D-0005, Task Order No. 0009, from the United States (U.S.) Army Corps of Engineers (USACE), Engineering and Support Center, Huntsville to perform a Site Inspection (SI) of Clovis Air Force Base (AFB) Precision Bombing Range (PBR) No. 1 (Formerly Used Defense Site [FUDS] Project No. K06NM037400). The site is in Lea County in southeast New Mexico, approximately 28 miles northwest of Hobbs, New Mexico and 10 miles northeast of Lovington, New Mexico. The property center is approximately at latitude 33°03'40" North, longitude 103°13'52" West. The site location is shown on Figure 1.1.

1.1.2 The Department of Defense (DoD) established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the USACE is conducting environmental response activities at FUDS for the Army, the DoD's executive agent for the FUDS program.

1.1.3 Pursuant to the USACE's Engineer Regulation (ER) 200-3-1 (USACE, 2004c) and the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], 2001), USACE is conducting FUDS response activities in accordance with the DERP statute (10 U.S. Code [USC] 2701 et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC §9601 et seq); Executive Orders 12580 and 13016; and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] Part 300). USACE is conducting remedial SIs, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

1.1.4 While not all MEC/MC constitute CERCLA hazardous substances, pollutants, or contaminants, the DERP statute provides the DoD the authority to respond to releases of MEC/MC, and DoD policy states that such responses shall be conducted in accordance with CERCLA and the NCP.

1.1.5 This report summarizes the work performed during the SI and presents an accounting of any MEC and MC contamination identified on the site. The SI is limited



exclusively to MEC and MC contamination issues and does not consider other unrelated hazardous and toxic waste (HTW) concerns that the site may pose. Per ER 200-3-1 guidance for conducting an SI, "The SI is not intended as a full-scale study of the nature and extent of contamination or explosive hazards" and requires the collection of a sufficient and appropriate amount of information.

## **1.2 PROJECT OBJECTIVES**

1.2.1 The primary objective of the MMRP SI is to determine whether a FUDS warrants further response action under CERCLA. The SI collects sufficient and appropriate information necessary to make this determination, as well as it:

- (i) determines the potential need for a removal action;
- (ii) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (EPA); and
- (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the remedial investigation and feasibility study (RI/FS).

An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSPP) project scope.

1.2.2 The primary project planning documents used to perform the SI include the Site-Specific Work Plan (SS-WP) Addendum for Clovis AFB PBR No. 1 (Parsons, 2006a) and the South Pacific Division Range Support Center Programmatic Work Plan (PWP) (Parsons, 2005). The performance work statement for this project is in Appendix A.

1.2.3 The USACE Albuquerque District facilitated and participated in a technical project planning (TPP) meeting on July 7, 2006 that included representatives from Parsons, EPA Region 6, and the New Mexico Environment Department (NMED). Sufficient information existed prior to conducting the field portion of the SI to support an NDAI recommendation. The TPP Team concurred that, based on historical information indicating that the site was never used by the DoD, collection and analysis of environmental samples would not be required. Instead, only a qualitative reconnaissance (QR) would be performed, and if MEC or munitions debris were observed during the SI, the site would then move to the remedial investigation phase.

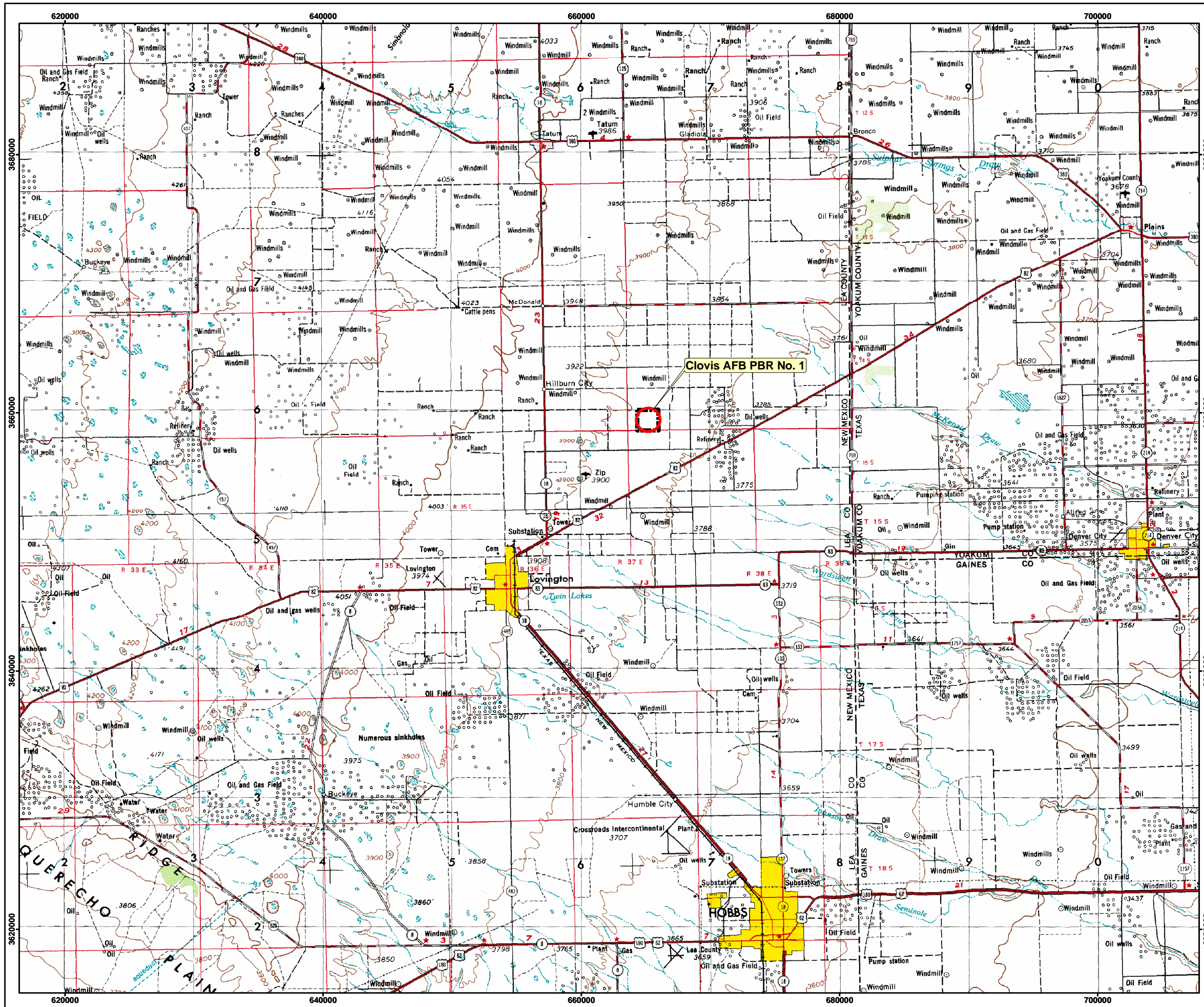


Figure 1.1  
Site Location  
Formerly Used Defense Site  
Clovis AFB PBR No. 1  
FUDS Project # K06NM037400  
Lea County, New Mexico

**Legend**  
— MRS Boundary  
- - - Installation Boundary



Image Source: USGS Topo Maps  
Projection: UTM Zone 13 NAD83, Map Units in Meters  
5 2.5 0 5 Miles

PARSONS

U.S. ARMY SOUTH  
PACIFIC DIVISION  
RANGE SUPPORT CENTER

DESIGNED BY:  
BT

DRAWN BY:  
BT

CHECKED BY:  
JB

SUBMITTED BY:  
GV

Site Location

SCALE: As Shown

DATE: January 2007

FILE: X:\GIS\Site\_inspections\_sw\Maps\clovis\_NM\_Fig1\_1.mxd

PROJECT NUMBER:  
744653.34000

PAGE  
NUMBER:

1-3



## **CHAPTER 2**

### **PROPERTY DESCRIPTION AND HISTORY**

#### **2.1 SITE DESCRIPTION**

The former Clovis AFB PBR No. 1 is in Lea County, New Mexico and is located approximately 28 miles northwest of the town of Hobbs, New Mexico. Figure 2.1 shows the site setting. The installation consisted of approximately a 1-square mile area (640 acres), and the bombing range boundary encompasses a circular area of 649 acres (USACE, 2004a).

#### **2.2 SITE LOCATION AND SETTING**

##### **2.2.1 Topography and Vegetation**

2.2.1.1 Clovis AFB PBR No. 1 is in the Southern High Plains section of the Great Plains physiographic province, which is characterized by broad inter-valley remnants of smooth fluvial plains. Figure 2.1 shows that the terrain at the site slopes gently to the southeast, with elevations ranging from approximately 3,875 feet above mean sea level (amsl) in the northwest portion of the site to 3,845 feet amsl in the southeast portion of the site. Land use is generally open range with smaller cultivated areas, with little vegetation. Photographs in Appendix E of this SI Report show the generally flat-lying topography of the site.

2.2.1.2 Vegetation consists of brush and low grasses suited to semiarid conditions (USACE, 2004b). At the time of the SI field work, vegetation was fairly sparse and easily allowed visual inspection of the ground surface. Photographs in Appendix E of this SI Report show the vegetation at the site.

##### **2.2.2 Soil**

The primary soil types at Clovis AFB PBR No. 1 are clay, silt, sand, and recently deposited alluvium underlain by indurated caliche at depths ranging from 20 to 40 inches. Typically, the surface layer is dark grayish-brown to brown, clayey, sandy silt to a depth of about 10 inches. The subsoil is grayish-brown, heavy, sandy, silty clay having a thickness of about 8 inches. The upper part of the substratum is light gray and is about 8 inches thick. It rests on indurated caliche. The soil is moderately permeable, and runoff is slow. The water intake rate is moderate, and the available water loading capacity is 5 to 7 inches. The frost line in the soils of this site is at a depth of 12 to 18 inches

(USACE, 2004b). Section 5.2.1 describes the regional geology and hydrogeology for this area.

### **2.2.3 Climate**

2.2.3.1 The climate of the Southern Great Plains Physiographic Province is characterized by abundant sunshine, moderate to high wind, low relative humidity, a large daily temperature range, and little precipitation.

2.2.3.2 The coldest temperatures occur in December and January, and the warmest in June and July. Temperatures are quite warm on most summer days, averaging approximately 93 degrees Fahrenheit, with a maximum recorded temperature of 114 degrees. (Western Regional Climate Center [WRCC], 2007). Storm clouds build up on many afternoons, retarding a further rise in temperature.

2.2.3.3 The annual average precipitation is 15.98 inches, with August and September being the wettest months (approximately 2.5 inches per month) and January, February, and March being the driest months (approximately 0.5 inch per month). About 80 percent of the annual precipitation occurs from May through October. Storm activity and rainfall decline markedly in late autumn (WRCC, 2007).

2.2.3.4 The pan evaporation rate exceeds 110 inches per year in Lea County, New Mexico, which greatly exceeds the average annual precipitation rate of approximately 16 inches per year in this area (WRCC, 2007). As a result, most precipitation is lost to evaporation or transpiration. The average annual runoff to surface water bodies in this area of Lea County is less than 0.2 inch (U.S. Geological Survey [USGS], 2007a).

### **2.2.4 Significant Structures**

The area is served by a primary highway (State Highway 82) and secondary dirt roads. Many of the dirt roads are present to service wells and other livestock related facilities. Fences on site contain cattle and separate state land from private land.

### **2.2.5 Demographics**

The nearest cities to Clovis AFB PBR No. 1 are Lovington, New Mexico, approximately 10 miles to the southwest and Hobbs, New Mexico, approximately 28 miles to the southeast. The community of Prairieview, approximately 2.5 miles to the northeast, is so small that it is not identified in U.S. Census Bureau (2006) data. Based on census data for the year 2000, the population within a 1-mile radius of Clovis AFB PBR No. 1 is estimated to be 39, and 164 people live within a 2-mile radius of the munitions response site (MRS) (U.S. Census Bureau, 2006). The populations of 21 people within the installation boundary and 27 people within the MRS boundary are determined using a conservative approach to calculate the population of an area by including the number of people for a partial census section that intersects the MRS boundary. No residences were observed within the site boundary by the field team during the SI site visit. Figure 2.2 shows the MRS boundary, the installation boundary,

and the 2000 census data used to calculate the population on and within 4 miles of the site.

## **2.2.6 Current and Future Land Use**

2.2.6.1 Prior to the acquisition of the property for Clovis AFB PBR No. 1, the primary land use was agricultural, chiefly livestock grazing. The property was acquired in two separate pieces in October 1943, presumably for use in training missions conducted from Hobbs Army Airfield and Clovis Army Airfield. However, historical evidence suggests that PBR No. 1 was not used. After World War II, the site reverted back to agricultural use, primarily livestock grazing (USACE, 2004b). The anticipated future land use is expected to remain the same. The post World War II land use would not have contributed MC- or MEC-related contamination, and the same can be said about the anticipated future land use.

2.2.6.2 Clovis AFB PBR No. 1 is accessible to the general public via four-wheel-drive vehicles driven along unpaved roads or by travelers stopping on the roads that pass through the area. A barbed-wire cattle fence with a few range gates surrounds the site, although access is not controlled.

## **2.3 SITE OWNERSHIP AND HISTORY**

2.3.1 Prior to the lease of the site by the DOD, the land at the former Clovis AFB PBR No. 1 was used for agricultural purposes, primarily livestock grazing. The property was acquired in two separate 320-acre pieces in October 1943. The pieces were referred to as Camp Site 1-A (eastern half of Section 31, Township 14 South, Range 37) and Camp Site 1-B (western half of S32, T14S, R37) and were originally assigned to Hobbs Army Airfield. The two pieces of land were collectively referred to as Hobbs AAF PBR No. 3, although at some point in the next couple of months the site was apparently transferred to Clovis AFB. Army Air Force correspondence from October of 1943 indicated that 4 ranges near the town of Tatum, New Mexico were being used for training purposes by Clovis AFB bombers. The same letter later indicates that only 3 of the 4 ranges were actually being used. War Department documents from December 1943 discuss the use of ranges previously held by Clovis AFB by flights from Roswell AAF. These documents refer to Clovis PBRs Nos. 3, 4, and 5, which were previously known as Hobbs PBRs Nos. 1, 2, and 4. No mention is made of either Hobbs PBR No. 3 or Clovis PBR No. 1 (USACE, 2004b).

2.3.2 Two site visits were conducted in support of the 1992 Inventory Project Report and the 2004 Preliminary Assessment Report (PA) for the site. Neither of the visits found any signs of former DOD use of the site. The INPR Report noted that the site was in use as a cotton field at the time of the site visit and surmised that any remnants of potential DOD use may have been plowed under during farming activities. However, an aerial photo taken in 1966 shows the center of the site as a relatively barren plain. There are no signs of a target, and although plowed fields do surround the center of the site, the



reported target location does not appear to be planted. The 1966 aerial photo is shown on Figure 2.3.

2.3.3 The majority of Clovis AFB PBR No. 1 site is currently owned by the State of New Mexico, which leases the land to private parties. Land ownership at the site is depicted on Figure 2.4.

## **2.4 REGULATORY COMPLIANCE**

The USACE is conducting the SI at Clovis AFB PBR No. 1 as part of FUDS response activities pursuant to and in accordance with the guidance, regulations, and legislation listed in Section 1.1.

## **2.5 PREVIOUS INVESTIGATIONS**

Parsons performed a document review for Clovis AFB PBR No. 1. Documents reviewed included the 1992 Inventory Project Report (INPR; Appendix F-1 in USACE, 2004b), the 2004 PA (USACE, 2004b), and the Archive Search Report (ASR) Supplement (USACE, 2004a). Previous investigations have indicated that Clovis AFB PBR No. 1 was never used for its intended purpose as a bombing range.

### **2.5.1 1992 Inventory Project Report**

The 1992 INPR, consisting of a findings and determination of eligibility and a project summary sheet (included as an appendix to the 2004 PA), determined that the property was eligible for the FUDS program. A site visit was conducted by USACE Albuquerque District personnel in 1991. The site visit team noted that none of the remnants typically associated with bombing ranges were visible at this site. Unlike the conditions observed at other PBRs in the area, the team found no target bulls-eye or area of debris suggesting past DOD-use of the site. It was noted in the INPR Report that the site was being farmed as a cotton field and that it was possible a bulls-eye had once been present but all signs of it had been destroyed by farming practices.

### **2.5.2 2004 Preliminary Assessment**

The 2004 PA documents a site visit, analysis of aerial photographs, records reviews, and interviews. The site visit team described the site as barren, with few features and little vegetation. The report notes that the INPR site visit team reported the site was planted with cotton. There PA team saw no sign of the cotton field but did say that they traveled to the assumed center of the target and referenced the lat/long coordinates reported for the site. No MEC, practice bomb debris, or target remnants were found during the site visit. The Evaluation of MEC Presence section of the PA Report states that the research conducted for the site did not confirm that the site had ever been used for its intended purpose as a precision bombing range.

### **2.5.3 2004 Archives Search Report Supplement**

The ASR Supplement was completed by the USACE St. Louis District as an addition to the 2004 PA. This document applied standard range configurations to the site, yielding specific range boundaries. The ASR Supplement examined the previous land use and concluded that the range was never used as intended and that no MEC were ever used at the range. No site visit was conducted in support of the ASR Supplement.

## **2.6 MUNITIONS AND EXPLOSIVES OF CONCERN**

Information observed in an aerial photograph of the site from 1996 and provided in the PA and ASR supplement indicate that the Clovis AFB PBR No. 1 site was never used for the intended purpose. There have been no known observances of MEC at this site.



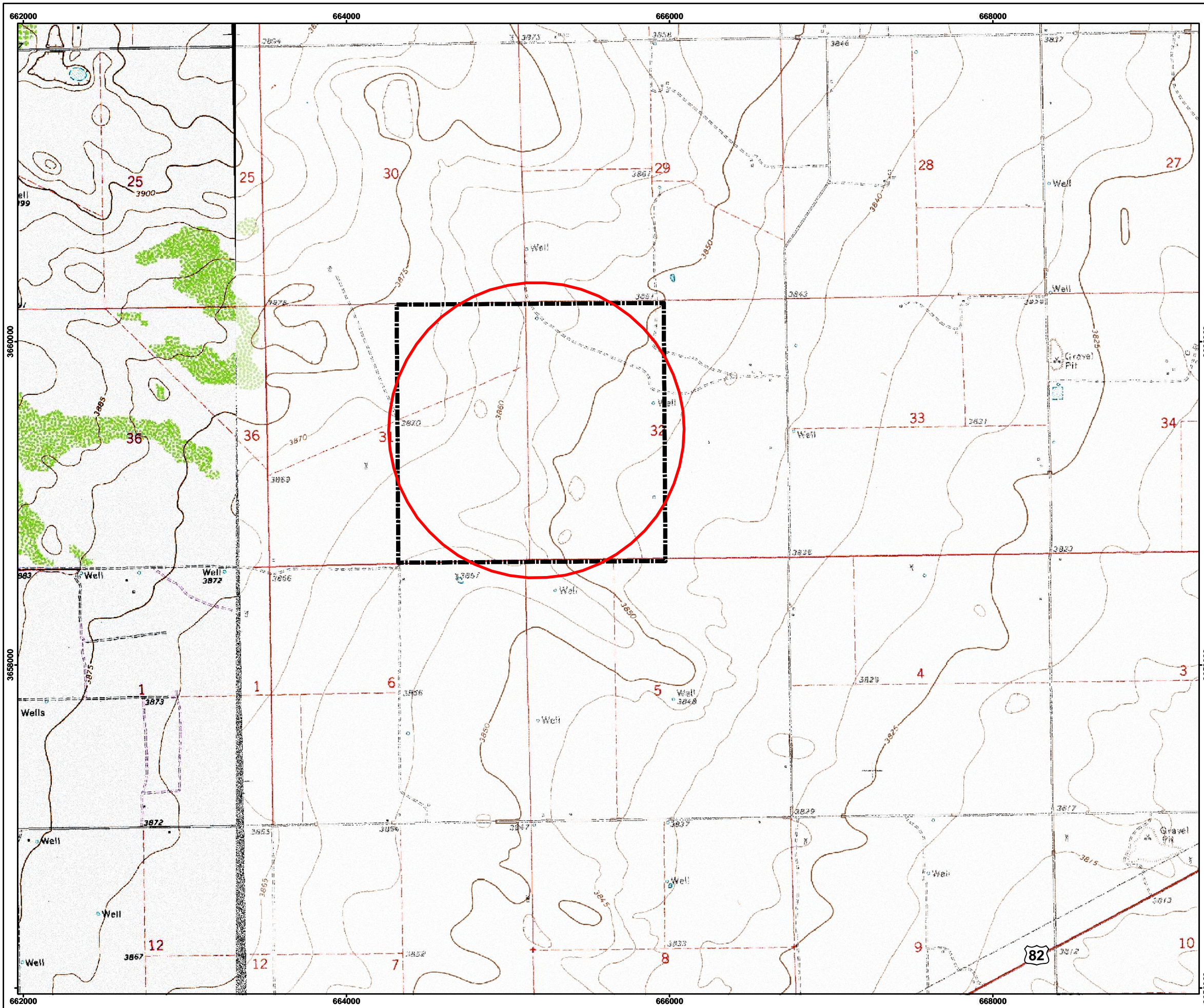


Figure 2.1

Site Setting  
Formerly Used Defense Site  
Clovis AFB PBR No. 1  
FUDS Project # K06NM037400

Lea County, New Mexico

### Legend

- MRS Boundary
- - - Installation Boundary

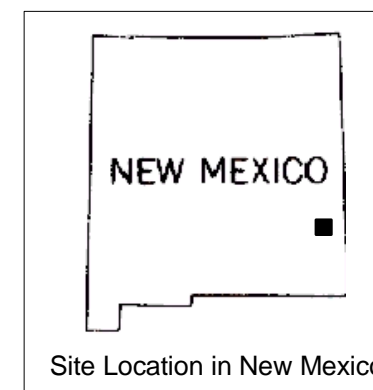


Image Source: USGS 7.5' Topo Quadrangles, 1980  
Projection: UTM Zone 13 NAD83, Map Units in Meters, Distance Units in Feet

2,000 1,000 0 2,000 Feet

PARSONS

U.S. ARMY SOUTH  
PACIFIC DIVISION  
RANGE SUPPORT CENTER

DESIGNED BY:  
BT

DRAWN BY:  
BT

CHECKED BY:  
JB

SUBMITTED BY:  
GV

### Site Setting

SCALE: As Shown

DATE: January 2007

FILE: X:\GIS\Site\_Inspections\_sw\Maps\clovis\_NM\Fig2\_1.mxd

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744653.34000

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NUMBER:  
2-6





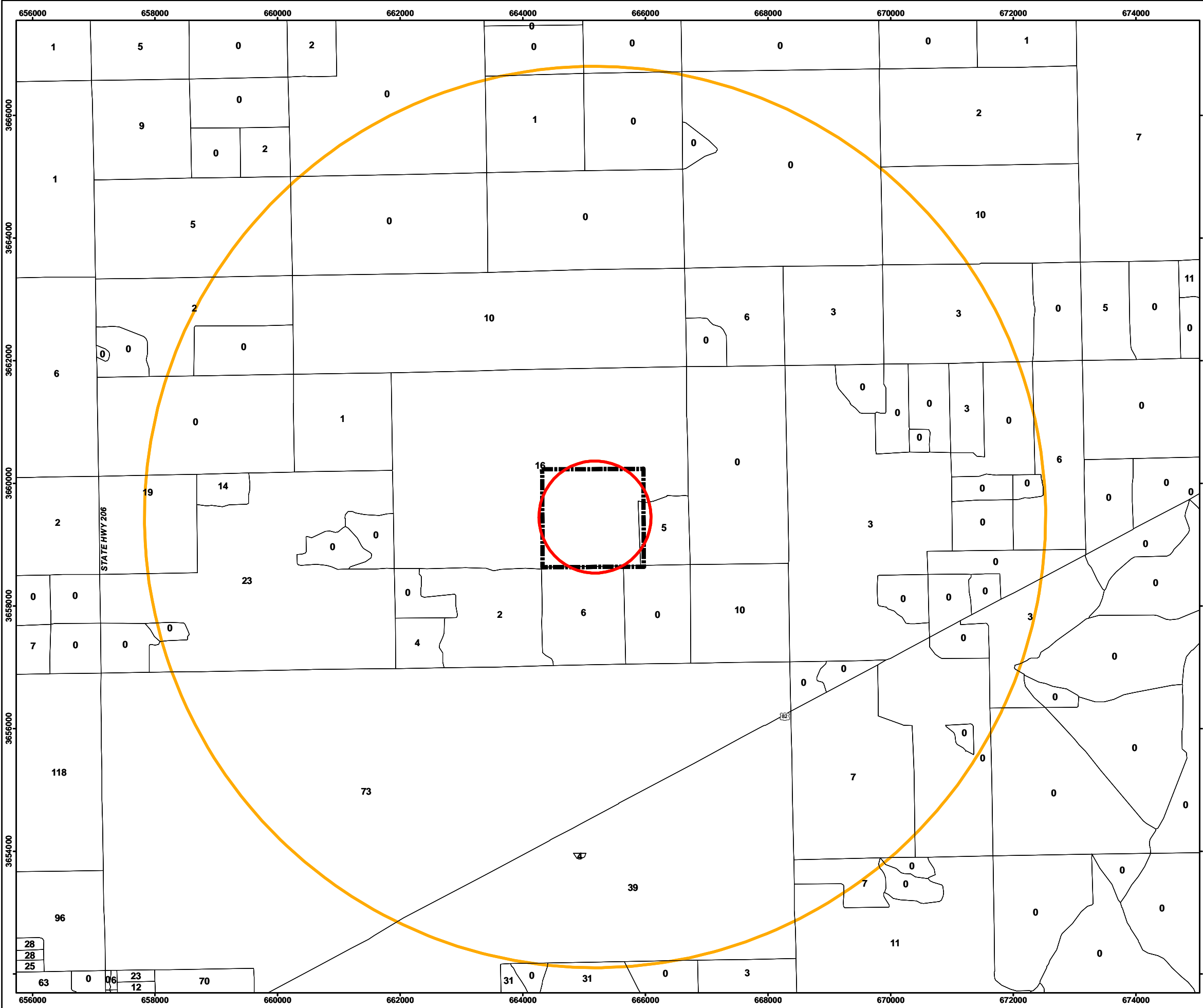


Figure 2.2

2000 Census Data  
Formerly Used Defense Site  
Clovis AFB PBR No. 1  
FUDS Project # K06NM037400

Lea County, New Mexico

**Legend**

- 12 2000 Census Block Boundary with Total Population
- MRS Boundary
- Installation Boundary
- 4-Mile Buffer

**NEW MEXICO**

Site Location in New Mexico

Image Source: USGS 7.5' Topo Quadrangles, 1980  
Projection: UTM Zone 13 NAD83, Map Units in Meters

1 0.5 0 1 Miles

PARSONS	U.S. ARMY SOUTH PACIFIC DIVISION RANGE SUPPORT CENTER	
DESIGNED BY: BT	2000 Census Data	
DRAWN BY: BT		
CHECKED BY: JB	SCALE: As Shown	PROJECT NUMBER: 744653.34000
SUBMITTED BY: GV	DATE: January 2007	PAGE NUMBER: 2-7
FILE: X:\GIS\Site_inspections_sw\Maps\clovis_NM\Fig2_2.mxd		

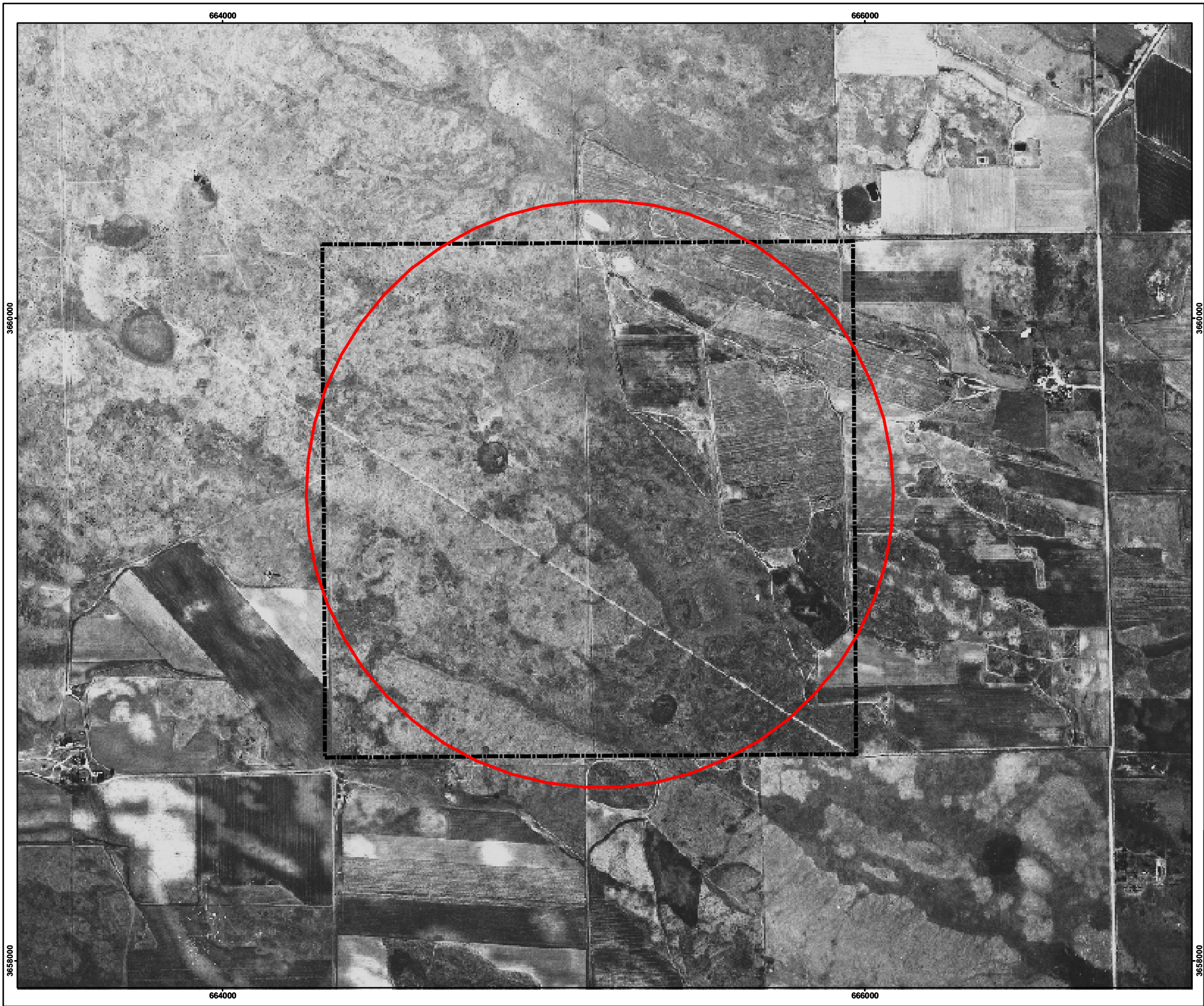


Figure 2.3

1966 Historical Aerial Photo  
Clovis PBR #1  
FUDS Project # K06NM037400  
Lea County, New Mexico

Legend


Bombing Range Boundary

Representative Qualitative Reconnaissance Track

Image Source: 1966 Georeferenced Aerial Photograph  
Projection: UTM Zone 13 NAD83, Map Units in Meters, Distance Units in Feet

Feet

1,000 500 0 1,000

PARSONS		U.S. ARMY SOUTH PACIFIC DIVISION RANGE SUPPORT CENTER	
DESIGNED BY: BT	1966 Historical Aerial Photo		
DRAWN BY: BT			
CHECKED BY: SC	SCALE: As Shown	PROJECT NUMBER: 744653.34000	
SUBMITTED BY: DS	DATE: October 2006	PAGE NUMBER:	
	FILE: X:\GIS\Site_inspections_sw\Maps\clovis_NM\Fig2_4.mxd	2-8	



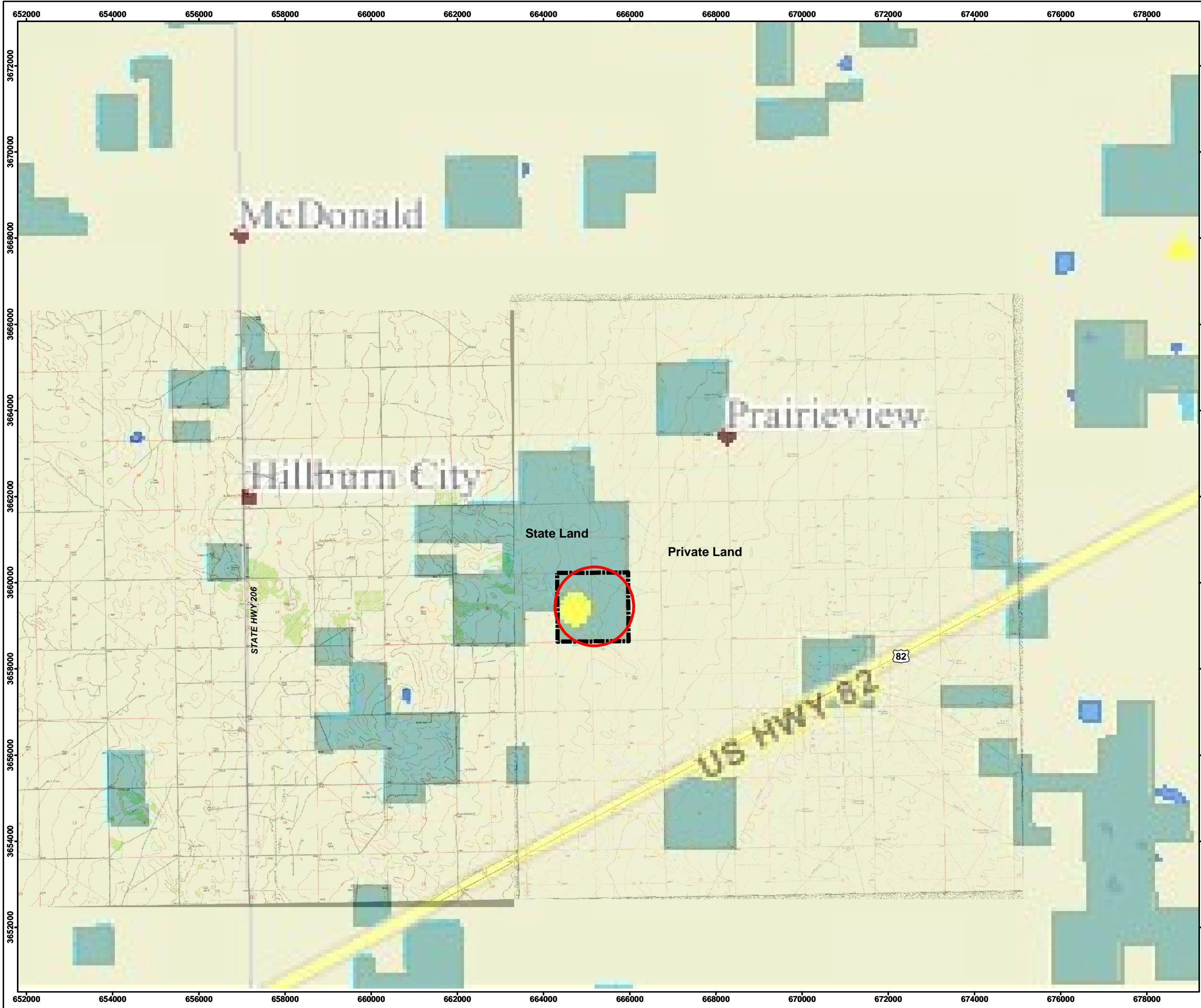


Figure 2.4

Land Ownership  
Formerly Used Defense Site  
Clovis AFB PBR No. 1  
FUDS Project # K06NM037400

Lea County, New Mexico


Legend

- MRS Boundary
- Installation Boundary



Image Source: USGS 7.5' Topo Quadrangles, 1980  
Projection: UTM Zone 13 NAD83, Map Units in Meters

5,000 2,500 0 5,000 Feet

PARSONS		U.S. ARMY SOUTH PACIFIC DIVISION RANGE SUPPORT CENTER	
DESIGNED BY: BT	Land Ownership		
DRAWN BY: BT			
CHECKED BY: JB	SCALE: As Shown	PROJECT NUMBER: 744653.34000	
SUBMITTED BY: GV	DATE: January 2007	PAGE NUMBER: 2-9	
	FILE: X:\GIS\Site_inspections_sw\Maps\clovis_NM\Fig2_3.mxd		

## **CHAPTER 3**

### **SITE INSPECTION TASKS**

#### **3.1 HISTORICAL RECORD REVIEW**

Parsons performed a document review for Clovis AFB PBR No. 1 as described in Section 2.5.

#### **3.2 TECHNICAL PROJECT PLANNING**

Clovis AFB PBR No. 1 falls under the purview of the USACE Albuquerque District, which facilitated a TPP meeting on July 7, 2006. Participants included representatives of the USACE Albuquerque District, Parsons, EPA Region 6, and the NMED. The TPP Team reached unanimous concurrence with the technical approach presented in the Final TPP Memorandum (Parsons, 2006b) (see Appendix B). Key TPP findings and decisions are summarized below:

- Clovis AFB PBR No. 1 is thought to have never been used as a bombing range, and no other historic military ordnance use at the site is known; therefore, no MC sampling is planned as part of the SI.
- The USACE Albuquerque District agreed to obtain official rights of entry (ROEs) from the owner and lessee at the site, the New Mexico State Land Office.
- Endangered species are potentially present onsite. Increased avoidance precautions for the SI would be developed and documented in the SS-WP.

#### **3.3 NON-MEASUREMENT DATA COLLECTION**

3.3.1 The USGS Albuquerque District provided geological and hydrogeological consultation, including information about wells on and near the site. The New Mexico Office of the State Engineer (OSE) also provided well information. Ken Williams of the EPA Region 6 Source Water Protection Program provided information about tribal drinking water supplies (EPA, 2007), and Darren Padilla of the NMED Drinking Water Bureau provided information regarding wellhead protection on nontribal lands and surface water intakes for drinking water systems (NMED, 2007a and 2007b).

3.3.2 The following printed and electronic information sources were consulted as part of the Clovis AFB PBR No. 1 SI:

## DRAFT FINAL

- Topographic maps – USGS
- Wetlands Online Mapper – National Wetlands Inventory (NWI), U.S. Fish and Wildlife Service (USFWS), <http://wetlandsfws.er.usgs.gov/wtlnds/launch.html>
- Threatened and Endangered (T&E) Species System (TESS) – Endangered Species Program, USFWS, [http://ecos.fws.gov/tess\\_public/StateListing.do?state=all](http://ecos.fws.gov/tess_public/StateListing.do?state=all)
- Natural Heritage New Mexico (NHNM) – Museum of Southwestern Biology at the University of New Mexico, [http://nhnm.unm.edu/data/free\\_info.html](http://nhnm.unm.edu/data/free_info.html), accessed April 4, 2006
- National Wildlife Refuge System (NWRS) – USFWS, <http://www.fws.gov/refuges/profiles/bystate.cfm>
- National Park Service (NPS), <http://www.nps.gov/applications/parksearch/geosearch.cfm>
- U.S. Department of Agriculture Forest Service, <http://www.fs.fed.us>
- National Register Information System (NRIS) – National Register of Historic Places (NRHP), <http://www.nr.nps.gov/nr>
- NRIS – National Register Historic Districts (NRHD), <http://www.historicdistricts.com>
- List of National Historic Landmarks (NHLs) – National Historic Landmarks Program (New Mexico), <http://www.cr.nps.gov/nhl/>
- List of National Heritage Areas (NHAs) – National Heritage Areas Program, <http://www.cr.nps.gov/heritageareas/>
- New Mexico Department of Game and Fish (NMDGF), <http://www.wildlife.state.nm.us/index.htm>
- New Mexico Historic Preservation Division, [http://www.nmhistoricpreservation.org/PROGRAMS/register\\_statnatl.html](http://www.nmhistoricpreservation.org/PROGRAMS/register_statnatl.html)
- New Mexico Historic Preservation Division – Archeological Records Management Section, <http://www.nmhistoricpreservation.org/PROGRAMS/register.html>
- National Oceanic and Atmospheric Administration (NOAA) – Coastal Zone Management Program (CZMP)
- Groundwater Atlas of the United States, <http://capp.water.usgs.gov/gwa>

- USGS – Water Resources of New Mexico, <http://nm.water.usgs.gov/basins.htm>

### **3.4 SITE-SPECIFIC WORK PLAN**

3.4.1 The SS-WP (Parsons, 2006a) augments the PWP and programmatic sampling and analysis plan (PSAP; USACE, 2005), as warranted, to present pertinent site-specific information and procedural adjustments that could not be readily captured in the programmatic documents or that resulted from TPP Team agreements that required modification of the preliminary SI technical approach. The NMED concurred with the technical approach and field procedures presented in the SS-WP.

3.4.2 The PWP and PSAP are intended to be umbrella documents that set overall programmatic objectives and approaches, whereas the SS-WP provides site-specific details and action plans. The PWP, PSAP, and SS-WP accompanied the SI field team during SI field activities.

3.4.3 The SS-WP includes the project description, the field investigation plan, the environmental protection plan, and the health and safety plan specific to Clovis AFB PBR No. 1. The field investigation plan developed a technical approach to guide the QR to support a systematic justification for either an NDAI determination or a determination that additional investigations are necessary. Key elements of the technical approach include the development of a conceptual site model (CSM) to help develop the plan for SI activities, specification of data quality objectives (DQOs) to ensure that the data acquired are sufficient to characterize the site, and performance of a QR to evaluate the presence or absence of MEC/MC in remote portions of the site. As Clovis AFB PBR No. 1 is thought to have never been employed as a bombing range and no other historic military ordnance use at the site is known, no MC sampling was performed as part of the SI.

### **3.5 DEPARTURES FROM PLANNING DOCUMENTS**

There were no departures from the planning documents.

## **CHAPTER 4**

### **QUALITATIVE RECONNAISSANCE FINDINGS**

#### **4.1 GENERAL INFORMATION**

##### **4.1.1 Qualitative Reconnaissance**

4.1.1.1 As stated previously, the primary task of the SI was to assess the presence of MEC and/or munitions debris. To do so, the field team conducted a QR by walking approximately 5.8 miles on November 30, 2006.

4.1.1.2 Site QR consisted of visual reconnaissance of the ground surface to provide qualitative data on potential subsurface anomalies, and identification of visual indicators of suspect areas, including earthen berms, distressed vegetation, stained soil, ground scars or craters, target remnants, and visible metallic debris. QR activities were performed over a representative portion of the site. A Schonstedt GA-92XTi magnetometer was used to aid in the detection of surface metal potentially present within the vegetation present at the site.

4.1.1.3 Figure 4.1 shows the QR paths and observation locations. The QR path and observation locations were recorded by the field team using a global positioning system (GPS). As discussed in the SS-WP, the QR route was not limited to the proposed path, but was determined in the field by the field team leader based on the baseline quality control (QC) procedures described in Chapter 3 of the PWP, visual observations, and areas of predetermined focus (Parsons, 2006a). There were no MEC anticipated to be present at the site based on the INPR, the PA, and ASR Supplement. The MEC CSM is included in Appendix J.

4.1.1.4 During the QR, the SI team noted 28 discrete field observations such as topography, soil color, drainage, and the presence of any barriers. No observation of MEC, munitions debris, small arms debris, or subsurface anomalies occurred during the QR. Related field forms are provided in Appendix D, and a photodocumentation log of the QR is provided in Appendix E.

##### **4.1.2 Data Quality Objectives**

###### **4.1.2.1 Introduction**

4.1.2.1.1 DQOs are qualitative and quantitative statements that clarify study objectives and specify the type and quality of the data necessary to support decisions.

The development of DQOs for a specific site takes into account factors that determine whether the quality and quantity of data are adequate for project needs, such as data collection, uses, types, and needs. While developing these DQOs in accordance with the process presented in Chapter 3, paragraph 3.1.2 of the PWP, Parsons followed the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001 (EPA, 2006). The DQOs for the SI were developed to achieve the objectives outlined in Subsection 1.2 of this SI report.

4.1.2.1.2 The goal of the TPP process is to achieve stakeholder, USACE, and applicable state and federal regulatory concurrence with the DQOs for a given site. The TPP Team approved Clovis AFB PBR No. 1 DQOs at the TPP meeting in July 2006. Appendix B of this SI Report presents the TPP documentation, including the DQO worksheets.

#### **4.1.2.2 Qualitative Reconnaissance Data Quality Objective**

The QR DQO was achieved by employing the QR protocol detailed in the PWP to document visual observations of field conditions.

#### **4.1.2.3 Munitions Response Site Prioritization Protocol Data Quality Objective**

The MRSPP DQO was achieved by obtaining sufficient information to complete the MRSPP scoring sheets. Specific input data were collected, and the three modules for the MRSPP were populated as part of the SI. The scoring sheets for the MRSPP are included in Appendix K.

#### **4.1.2.4 Hazard Ranking System Data Quality Objective**

No MC sample collection or analysis was performed for the Clovis AFB PBR No. 1 SI. Therefore, the HRS DQO was achieved by including information in the SI report necessary for the EPA to populate the HRS score sheets. Source documents for the HRS information include the INPR, ASR, and ASR Supplement documents, as well as local and state agencies regarding population, groundwater well users, and drinking water well use.



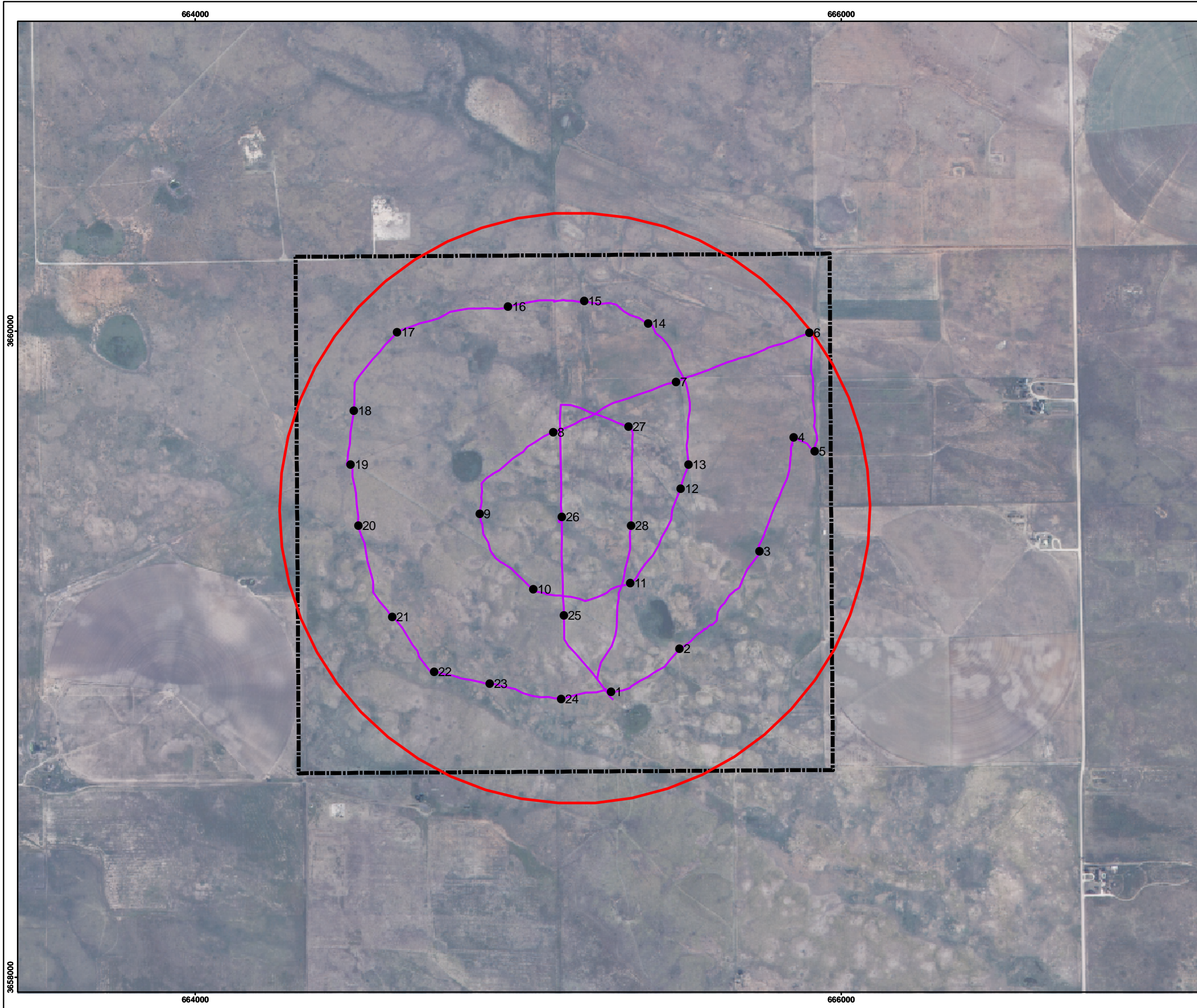


Figure 4.1

**Qualitative Reconnaissance and  
Field Observation Locations**

**Formerly Used Defense Site**

**Clovis AFB PBR No. 1**

**FUDS Project # K06NM037400**

Lea County, New Mexico


**Legend**

- Field Observation Point
- MRS Boundary
- Qualitative Reconnaissance Track (Walked)
- - - Installation Boundary



Image Source: 2004 Orthophotos  
Projection: UTM Zone 13 NAD83, Map Units in Meters

1,000 500 0 1,000 Feet

PARSONS		U.S. ARMY SOUTH PACIFIC DIVISION RANGE SUPPORT CENTER	
DESIGNED BY: BT	<b>Qualitative Reconnaissance and Field Observation Locations</b>		
DRAWN BY: BT			
CHECKED BY: JB	SCALE: As Shown	PROJECT NUMBER: 744653.34000	
SUBMITTED BY: GV	DATE: January 2007	PAGE NUMBER:	
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## **CHAPTER 5**

### **MIGRATION/EXPOSURE PATHWAYS AND TARGETS**

This section of the SI report evaluates the potential for adverse impact on human health and the environment based on site-specific conditions. It is necessary to evaluate site-specific conditions and land use to evaluate risks posed to potential receptors under current and future land use scenarios. Exposure pathways for groundwater, surface water, soil, and air are evaluated in the following subsections. The CSMs for Clovis AFB PBR No. 1 (Appendix J) summarize which potential receptor exposure pathways are (or may be) completed and which are (and are likely to remain) incomplete. An exposure pathway is not considered to be completed unless all four of the following elements are present (EPA, 1989):

- A source and mechanism for chemical release;
- An environmental transport/exposure medium;
- A receptor exposure point; and
- A receptor and a likely route of exposure at the exposure point.

#### **5.1 HISTORICAL MC INFORMATION**

Historical information, including that provided in the PA and ASR supplement, indicate that Clovis AFB PBR No. 1 was never used as a bombing range. There are no known MEC at this site.

#### **5.2 GENERAL INFORMATION**

Groundwater quality can be impacted if contamination in surface or subsurface soil leaches to groundwater. Potential impacts to groundwater are influenced by site-specific factors, including contaminant characteristics, geology, hydrogeology, climatic conditions, and groundwater usage in the area.

##### **5.2.1 Regional Geologic and Hydrogeologic Setting**

5.2.1.1 Clovis AFB PBR No. 1 is in the Southern High Plains section of the Great Plains Physiographic Province. This province is characterized by broad inter-valley remnants of smooth fluvial plains and consists of numerous formations ranging in age from Paleocene to Pliocene (USACE, 2004b).

5.2.1.2 Clovis AFB PBR No. 1 overlies the western edge of the High Plains Aquifer, which underlies an area of approximately 170,000 square miles that extends through parts of Colorado, Kansas, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer is the principal source of water in one of the major agricultural areas of the United States. The western edge of the High Plains Aquifer approximately borders the boundary between Lea County to the east and Chaves and Eddy Counties to the west. The northern half of Lea County, including Clovis AFB PBR No. 1, is underlain by the High Plains Aquifer (USGS, 2007a).

5.2.1.3 The Tertiary-aged Ogallala Formation is the principal geologic unit in the High Plains aquifer in eastern Colorado and New Mexico and underlies the Clovis AFB PBR No. 1. The Ogallala Formation generally consists of an unconsolidated and poorly sorted sequence of gravel, sand, silt, and clay. Moderately to well-cemented zones within the Ogallala Formation resist weathering and form ledges in outcrop areas. The most distinctive of these ledges, the Ogallala cap rock, is near the top of the Ogallala in large areas of New Mexico, where it can be as thick as 60 feet (USGS, 2007a).

5.2.1.4 The portion of the High Plains aquifer that extends into New Mexico is not hydraulically connected to other principal aquifers. The thickness of the Ogallala Formation that underlies the High Plains of New Mexico is highly irregular and can range from 0 to approximately 500 feet (USGS, 2007a). The average hydraulic conductivity of the High Plains aquifer in Lea County is 50 feet per day (USGS, 1985), the average saturated thickness of the aquifer is 75 feet, and the transmissivity is approximately 4,500 square feet per day (USGS, 2007a).

5.2.1.5 The bedrock formation underlying the High Plains Aquifer primarily consists of impermeable shale. In some areas, water-yielding sandstone is interlayered with the shale near the base of the High Plains Aquifer and may yield a sufficient volume of water to be of local importance, but these sandstone units lack the areal extent necessary to constitute a principal aquifer (USGS, 2007a).

5.2.1.6 The water table in the High Plains Aquifer is continuous in the vicinity of Clovis AFB PBR No. 1 with a saturated thickness of less than 100 feet (USGS, 2007a). Depth to water near Lea County is generally less than 100 feet below ground surface (bgs) (USGS, 2007a). Water levels in Lea County have been declining since irrigation withdrawal became widespread and, as of 1985, had declined an estimated 60 feet from predevelopment levels and were continuing to decline at an average rate of 1 foot per year (USGS, 1985). Declining water levels in the High Plains Aquifer have substantially decreased the saturated thickness of the aquifer in some areas, resulting in reduced well yields (USGS, 2007a). Depth to groundwater in drinking water wells adjacent to the site ranges from 25 to 120 feet bgs, based on the New Mexico OSE (2006) Water Administration Technical Engineering Resource System (WATERS) database.

5.1.1.7 The regional groundwater flow is generally to the southeast, similar to the slope of the land surface, but the local groundwater flow direction may be more variable due to local changes in the bedrock surface, recharge, and discharge. Recharge to the

High Plains Aquifer in New Mexico is primarily derived from infiltration of precipitation or seepage from intermittent surface flow in streams; however, as described in Section 2.2.3, most precipitation is lost to evaporation from soil or is transpired by vegetation before it can percolate to the water table and recharge the aquifer. It is estimated that only 3 to 4 percent of the precipitation falling on the High Plains reaches the water table, translating to less than 0.5 inch of recharge per year (USGS, 1985). Most precipitation recharge occurs during periods of snowmelt or prolonged rainfall.

## **5.2.2 Regional Groundwater Use**

5.2.2.1 The Drinking Water Bureau of the NMED is designated as the lead agency for the state's Wellhead Protection Program. The NMED Drinking Water Bureau confirmed that there are no Wellhead Protection Areas within 4 miles of the site (NMED, 2007a). According to EPA Region 6 (EPA, 2007), most tribes in New Mexico have a trust relationship with the federal government, and their drinking water programs are administered by EPA's Region 6 Source Water Protection Program. According to EPA records, there are no federally recognized tribes or tribal Source Water Protection areas within the site or within 4 miles of the site boundary.

5.2.2.2 A total of 286 water wells are reported to exist within a 4-mile buffer zone from the installation boundary, as shown on Figure 5.1 and listed in Table 5.1. Of these 286 water wells, 134 drinking water wells are reported to exist within a 4-mile buffer zone around the installation boundary. No domestic drinking water supply wells have been identified within the property boundary.

**Table 5.1**  
**Groundwater Wells in the Vicinity of**  
**Clovis AFB PBR No. 1**

<b>Distance from Site</b>	<b>Domestic Wells</b>	<b>Stock / Irrigation Wells</b>	<b>Other<sup>1</sup> Wells</b>	<b>Total</b>
<b>On Site</b>	None	2	None	2
<b>0 to ¼ Mile</b>	1	3	None	4
<b>¼ to ½ Mile</b>	5	1	None	6
<b>½ to 1 Mile</b>	7	8	None	16
<b>1 to 2 Miles</b>	39	41	7	87
<b>2 to 3 Miles</b>	21	45	2	68
<b>3 to 4 Miles</b>	61	39	4	104
<b>Site to 4 Miles</b>	134	139	13	286

<sup>1</sup> Includes dairy operation, sanitary in conjunction with commercial use, or unknown use wells  
Detailed well information is included in Appendix L

5.2.2.3 Information regarding the specific number of individuals using each of the drinking water wells was not available. Therefore, using available population information based on U.S. census data for the year 2000, the SI assumes that the 27 people living onsite and the 329 people living within 4 miles of the MRS use domestic water wells. Population information was determined by including the total number of people indicated in the census data blocks for any blocks (partial or complete) intersected

by the 0- to 4-mile buffer zone around the site. Population data are summarized in Table 5.2, which is based on the 2000 census data shown on Figure 2.2.

5.2.2.4 Additional research regarding the number of individuals using drinking water wells was not conducted because the groundwater pathway was determined to be incomplete, based on the evidence that the site was never used by the DoD and consequent lack of DoD-related contamination. The principal use of groundwater in Lea County was reported as agricultural (USGS, 2007a).

**Table 5.2**  
**Population Information in the Vicinity of**  
**the Former Clovis AFB PBR No. 1**

<b>Range</b>	<b>On Site</b>	<b>0 to 1/4 Mile</b>	<b>1/4 to 1/2 Mile</b>	<b>1/2 to 1 Mile</b>	<b>1 to 2 Miles</b>	<b>2 to 3 Miles</b>	<b>3 to 4 Miles</b>	<b>Total</b>
<b>Installation Boundary</b>	21	8	10	0	123	69	65	296
<b>Bombing Range</b>	27	2	0	83	52	68	97	329

Source: U.S. census 2000 data. Note that the populations of 21 and 27 people within the installation and bombing range boundaries, respectively, are considered to be an artifact of the conservative approach that was used to calculate the population of an area by including the total number of people for a partial census section that intersects the installation boundary or PBR No. 1 boundary (Figure 2.2). No residences were observed within the site boundary by the field team during the SI site visit.

### **5.2.3 Regional Hydrologic Setting**

5.2.3.1 Clovis AFB PBR No. 1 lies within the Texas Gulf Basin, which occupies roughly the north half of Lea County and Roosevelt County in New Mexico (USGS, 2007b). This basin is referred to as the Colorado River Basin on the east side of the Texas/New Mexico border. Surface water generally flows to the southeast toward the Colorado River in Texas. The headwaters of the nearest tributary of the Colorado River, the North Colorado River, are located in Texas, approximately 100 miles southeast of the site. There are no rivers near the site that would receive any runoff.

5.2.3.2 Based on surface topography, surface water at the site resulting from precipitation would generally flow toward the southeast, with localized variations. Surface water does not typically exit the site due to the limited amount of rainfall and high evapotranspiration rates for this area (Section 2.2.3), and surface water overland flow would be limited during precipitation due to the relatively flat topography and lack of any well-developed drainages.

## **5.3 MIGRATION PATHWAY EVALUATION**

### **5.3.1 Groundwater Migration Pathway**

The TPP Team agreed that a potentially complete human drinking water exposure pathway is not present at this site (no known source of contamination and no drinking

water wells within the site boundary). Therefore, the TPP Team agreed that no soil, sediment, or water sampling would be performed during the SI. This conclusion is supported by the QR, which found no MEC or munitions-related debris.

#### **5.3.1.1 Geologic and Hydrogeologic Setting**

Surface soil in the area consists of eolian or alluvial deposits of sand, silt, and clay underlain by clays and silts. A hardened caliche layer is present at depths between approximately 20 and 40 inches bgs. The soil permeability is moderate and decreases with depth, and frost development in the soil extends to a depth of about 12 to 18 inches (USACE, 2004b). Section 5.2.1 describes the regional geology and hydrogeology for this area.

#### **5.3.1.2 Known and Potential Releases to Groundwater**

There are no known releases of MC to groundwater at Clovis AFB PBR No. 1. In addition, future releases are not expected to occur based on the fact that all historical and SI-related information suggest MEC were never used at the site.

#### **5.3.1.3 Ground Water Migration Pathway Targets**

5.3.1.3.1 A total of 286 water wells are reported to exist within a 4-mile buffer zone around the bombing range boundary. Of these 286 wells, 134 are reported to be drinking water wells. No domestic drinking water supply wells have been identified within the bombing range boundary. At least one water well and several pieces of irrigation equipment were observed by the SI team during the QR.

5.3.1.3.2 Information regarding the specific number of individuals using each of the 134 drinking water wells within the 4-mile buffer around the MRS is unavailable. Therefore, a population of 329 people within a 4-mile buffer (similar range as the drinking water well locations) was derived using conservative estimates for the distances shown in Table 5.2 for Clovis AFB PBR No. 1 based on U.S. census data for the year 2000.

#### **5.3.1.4 Ground Water Sample Locations/Methods**

As indicated in Section 5.3.1, groundwater samples were not collected during the SI at Clovis AFB PBR No. 1.

#### **5.3.1.5 Ground Water Migration Pathway Analytical Results**

As indicated in Section 5.3.1, groundwater samples were not collected during the SI at Clovis AFB PBR No. 1.

#### **5.3.1.6 Ground Water Migration Pathway Conclusions**

The groundwater migration pathway is not considered to be a complete pathway that will adversely impact human or environmental receptors. This conclusion is primarily

based on the absence of a source of MC contamination, but also on the limited transport mechanism and limited groundwater receptors in the immediate vicinity of this site. Further evaluation of groundwater quality at Clovis AFB PBR No. 1 is not warranted for the following reasons:

- Historical information indicates that the Clovis AFB PBR No. 1 site was never used and there are no known MEC or munitions-related debris at this site. In addition, there are no ongoing or planned future site activities that would provide a future source of MC contamination; therefore, no current or potential future sources of MC have been identified that could potentially impact groundwater.
- If a source of MC was present, potential impacts to groundwater via surface water infiltration would be negligible due to local climatic conditions that result in minimal surface water infiltration.
- Receptors for groundwater in this area are limited due to the absence of drinking water wells on site. The closest drinking water wells are outside of the site and bombing range boundaries; the nearest is believed to be approximately 0.1 mile from the bombing range boundary.

### **5.3.2 Surface Water Migration Pathway**

Surface water can potentially serve as a contaminant transport mechanism that may impact surface water bodies, sediment, drinking water supplies, vegetation, and sensitive environments such as wetlands.

#### **5.3.2.1 Releases and Potential Releases to Surface Water**

5.3.2.1.1 The limited surface water in the area can be attributed to the climatic conditions, which result in most precipitation being lost to evaporation or transpiration, as described in Section 2.2.3. In New Mexico, intense precipitation may result in surface runoff that can contribute to flow in ephemeral streams with channels above the water table; that runoff is subsequently lost to underlying alluvial deposits and eventually to the High Plains Aquifer. However, high flow in normally dry stream channels is uncommon, and significant recharge in these areas generally occurs only at intervals of many years (USGS, 2007a). In addition, the relatively flat surface topography minimizes runoff at this site. Contact with surface water and stream sediments at or downstream of this site is not a likely exposure pathway because surface water is rarely present and does not typically exit the site due to limited precipitation and high evapotranspiration rate.

5.3.2.1.2 The NMED Drinking Water Bureau confirmed that there are no surface water intakes for drinking water systems within 15 miles of the site boundary (NMED, 2007b). NMED does not publish the locations of surface water intakes for security reasons. No known wetlands or other sensitive environments were identified at Clovis AFB PBR No. 1.

### **5.3.2.2 Surface Water Migration Pathway Targets**

There are no known previous surface water sampling results for Clovis AFB PBR No. 1. The TPP Team agreed that surface water sampling was not necessary during the SI because of the absence of MC contamination sources (the site was never used), absence of significant surface water bodies, and limited presence of a surface water transport mechanism at this site. Therefore, there is no potential for surface water or sediment contamination due to MC at this site.

### **5.3.2.3 Sample Locations/Methods**

Surface water sampling was not performed during the SI at Clovis AFB PBR No. 1.

### **5.3.2.4 Surface Water Migration Pathway Conclusions**

The surface water migration pathway is not considered to be a complete or potentially complete pathway that will adversely affect human or environmental receptors. This conclusion is based on the absence of a source for MC contamination and on the lack of a transport mechanism and surface water bodies at or near this site. Further evaluation of surface water and sediment at the Clovis AFB PBR No. 1 is not warranted for the following reasons:

- MC contamination is not believed to exist, and there are no ongoing site activities that would provide a source of MC contamination. Based on historic site information and expected future land use (ranching), there are no identified current or potential future sources of MC at the site that could impact surface water or sediment.
- A surface water or sediment transport mechanism is not present at this site due to limited precipitation, a high evapotranspiration rate, the relatively flat ground surface topography, and consequent scarcity of surface water.
- Given the lack of surface water bodies in the area, surface water is not used for drinking water or recreational purposes; therefore, no completed exposure pathway exists that would represent a potential threat to human health.

### **5.3.3 Soil Exposure Pathway**

Potential soil exposure pathways include ingestion, dermal contact, ecological exposure, and leaching to groundwater. The likelihood of exposure is influenced by such factors as the volume and concentration of contaminated soil exposed at the ground surface; site-specific geology, hydrogeology, and climate; and the expected future land use.



#### **5.3.3.1 Physical Source Access Conditions**

Access to Clovis AFB PBR No. 1 site is limited due to the remote location. There are only limited cattle fences to physically restrict access to this area.

#### **5.3.3.2 Actual or Potential Contamination Areas**

There are no known contamination areas within Clovis AFB PBR No. 1 site. There is no potential for contamination because there is no known source of MC contamination present.

#### **5.3.3.3 Soil Exposure Targets**

There were no residences observed within Clovis AFB PBR No. 1 during the QR in November 2006. Approximately 27 people live within the Clovis AFB PBR No. 1 boundary, and approximately 112 live within a 1-mile buffer zone around this boundary based on the 2000 census (Table 5.2). However, the indicated population within the site boundary is considered to be an artifact of the conservative approach that was used to calculate the population of an area by including the total number of people for a partial census section that intersects the installation boundary or PBR No. 1 boundary (Figure 2.2). Except for the small community of Prairieview to the northeast of the site, the nearest residential areas are Lovington, New Mexico, approximately 10 miles to the southwest and Hobbs, New Mexico, approximately 28 miles to the southeast. Scattered residences are found throughout the area. The current and anticipated future use of the land is for ranching, particularly cattle grazing.

#### **5.3.3.4 Sample Locations/Methods**

Soil sampling was not performed during the SI at Clovis AFB PBR No. 1.

#### **5.3.3.5 Soil Exposure Conclusions**

The soil exposure pathway is not considered to be a completed pathway at the Clovis AFB PBR No. 1 site that will adversely affect human or environmental receptors. This conclusion is based on the following considerations:

- The absence of a contaminant source and
- The improbability of a potential mechanism for future releases of MC based on the anticipated land usage.

#### **5.3.4 Air Migration Pathway**

The air migration pathway accounts for hazardous substance migration in gaseous or particulate form through the air. Airborne deposition of contaminants can be a potential threat to people and sensitive environments.

#### **5.3.4.1 Climate**

Climate is discussed in Section 2.2.3.

#### **5.3.4.2 Releases and Potential Releases to Air**

There are no known releases to air at the Clovis AFB PBR No. 1 site. In addition, there is no potential for future releases based the fact that all historical and SI-related information suggests MEC were never used at the site.

#### **5.3.4.3 Air Migration Pathway Targets**

Target populations potentially impacted by the air pathway consist of people who reside, work, or go to school within the target distance limit of 4 miles around the site. According to the 2000 census, 112 and 329 persons live within a 1-mile and 4-mile buffer around Clovis AFB PBR No. 1, respectively (Table 5.2). The immediate area surrounding Clovis AFB PBR No. 1 has a low population, and the future use of this area is anticipated to remain limited primarily to cattle grazing and other agriculture. Based on the lack of contamination at the site, there is no likelihood for adverse effects associated with MC-contaminated windblown particulates generated at this site.

#### **5.3.4.4 Sample/Monitoring Locations/Methods**

Air sampling was not conducted as part of the SI at Clovis AFB PBR No. 1.

#### **5.3.4.5 Air Migration Pathway Conclusions**

Based on the current information available for the site, there is no potential for adverse impact to human or environmental receptors via the air migration pathway, and this pathway is considered incomplete. This conclusion is based primarily on the fact that no MC contamination is known to exist in site soils.



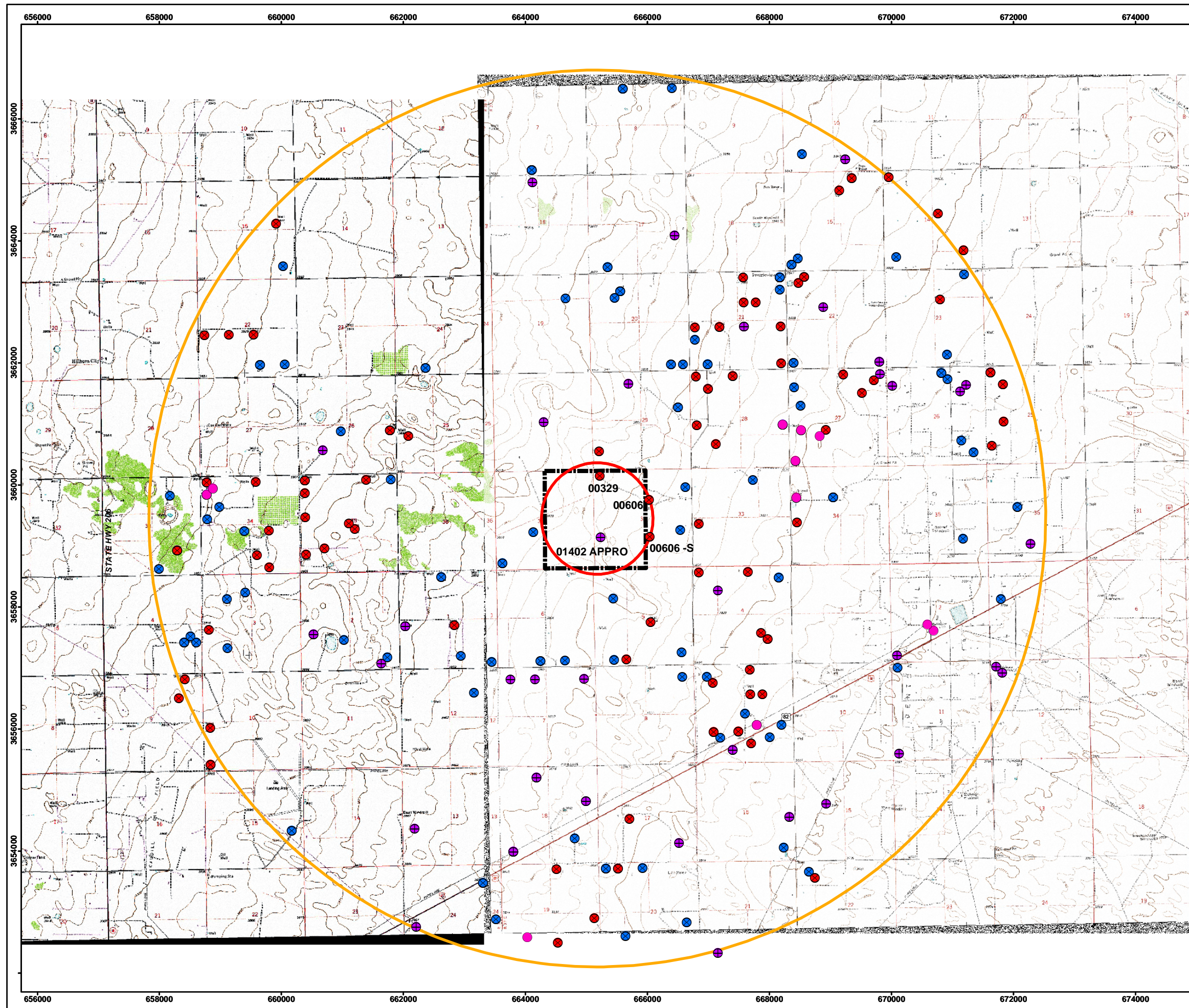


Figure 5.1

Water Well Locations  
Formerly Used Defense Site  
Clovis AFB PBR No. 1  
FUDS Project # K06NM037400

Lea County, New Mexico

**Legend**

- Drinking Water Well
- Stock Well
- Irrigation Well
- Other Water Well
- MRS Boundary
- Installation Boundary
- 4-Mile Buffer



Image Source: USGS 7.5' Topo Quadrangles, 1980  
Projection: UTM Zone 13 NAD83, Map Units in Meters

1 0.5 0 1 Miles

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## **CHAPTER 6**

### **SCREENING-LEVEL RISK ASSESSMENT**

#### **6.1 MUNITIONS AND EXPLOSIVES OF CONCERN SCREENING-LEVEL RISK ASSESSMENT**

6.1.1 A qualitative risk evaluation was conducted to assess potential explosive safety risk to the public at Clovis AFB PBR No. 1 and to qualitatively communicate the magnitude of the potential risk at the site and the primary causes of that potential risk. The risk evaluation presented herein is based on historical information presented in prior studies (the PA and the ASR Supplement) and the QR observances for the MRS.

6.1.2 An explosive safety risk is the potential for MEC to detonate and potentially cause harm as a result of human activities. An explosive safety risk exists if a person can come near or into contact with MEC and act on the item(s) to cause a detonation. The potential for an explosive safety risk depends on the presence of three critical elements: a source (presence of MEC), a receptor or person, and interaction between the source and receptor (such as picking up the item or disturbing the item). There is no risk if any one element is missing. Each of the three elements provides a basis for implementing effective risk-management response actions.

6.1.3 The exposure route for a MEC receptor is primarily direct contact as a result of some human activity. Agricultural or construction activities involving subsurface intrusion are examples of human activities that will increase the likelihood for direct contact with buried MEC. MEC will tend to remain in place unless disturbed by human or natural forces, such as erosion. Movement of MEC may increase the probability for direct human contact but not necessarily result in a direct contact or exposure.

##### **6.1.1 Conceptual Site Model**

CSMs can help identify risks to human health and the environment by identifying complete exposure pathways between physical media affected by site-related contamination (e.g., soil, water, air) and potential human or ecological receptors. The CSM for MEC at Clovis AFB PBR No. 1 is included in Appendix J.

##### **6.1.2 Definition of Risk Evaluation Factors, Categories, and Subcategories**

The potential risk posed by MEC was characterized qualitatively by evaluating three primary risk factors: 1) presence of MEC sources, 2) site characteristics that affect the

accessibility or pathway between the source and human receptor, and 3) human factors that define the receptors and type of activities that may result in direct contact between a receptor and a MEC source. By performing a qualitative assessment of these three factors, an overall assessment of the safety risk posed by unexploded ordnance (UXO) was evaluated. The following paragraphs describe the components of each of the primary risk factors.

#### **6.1.2.1 Presence of MEC Sources**

6.1.2.1.1 Four categories can be used to evaluate the presence of MEC risk. These include MEC type, MEC sensitivity, MEC density, and MEC depth distribution. At the SI stage, MEC density and MEC depth are generally unknown and are evaluated during the RI/FS stage.

6.1.2.1.2 **MEC type** affects the likelihood of injury and the severity of exposure. If multiple MEC are identified in an area, the item that poses the greatest risk to public health is selected for risk evaluation. Table 6.1 shows the four subcategories of MEC type, presented in order of severity from highest to lowest risk.

**Table 6.1**  
**MEC Type Subcategories**

<b>Subcategory</b>	<b>MEC Type Description</b>
Most severe	MEC that may be lethal if detonated by an individual's activities
Moderately severe	MEC that may cause major injury to an individual if detonated by an individual's activities
Least severe	MEC that may cause minor injury to an individual if detonated by an individual's activities
No injury	Munitions debris (inert) that will cause no injury

6.1.2.1.3 **MEC sensitivity** affects the likelihood of detonation and the severity of exposure. Factors considered in evaluating sensitivity include fuzing and environmental factors such as weathering. The category of sensitivity is based on the results of the SI field QR as well as the results of archival studies. When multiple subcategories of MEC types are discovered in an area, the highest risk subcategory is used in the risk evaluation. Table 6.2 defines the four subcategories of sensitivity, presented in order from highest to lowest.

**Table 6.2**  
**MEC Sensitivity Subcategories**

<b>Subcategory</b>	<b>MEC Sensitivity</b>
Very sensitive	MEC that has very sensitive fuzing, i.e., electronic fuzing, land mines, booby traps
Less sensitive	MEC that has standard fuzing
Insensitive	MEC that may have functioned correctly, or is unfuzed, but has a residual risk
Inert	Munitions debris (inert) will cause no injury

6.1.2.1.4 **MEC density** affects the likelihood that an individual will be exposed to MEC. There exists a direct relationship between density and potential for harm. For example, the more ordnance per acre, the greater the likelihood of exposure to MEC and thereby an opportunity to create an incident. Given the absence of reliable and confirmed subsurface data at the SI stage, MEC density will not be evaluated during the SI.

6.1.2.1.5 **MEC depth distribution** refers to where the MEC is located vertically in the subsurface. The MEC depth distribution affects the likelihood that an individual will be exposed to MEC. There exists an inverse relationship between the depth at which MEC are found and the likelihood of exposure to the MEC. That is, the greater the depth where the MEC are found, the lower the risk of exposure. There are two subcategories within the MEC depth distribution category: surface and subsurface. The surface subcategory includes those items recovered either on the ground surface, protruding from the ground surface, or beneath the leaf litter.

#### **6.1.2.2 Site Characteristics**

6.1.2.2.1 Two categories are evaluated in the site characteristics risk factor: site accessibility and site stability.

6.1.2.2.2 **Site accessibility** affects the likelihood of encountering MEC. Natural or physical barriers can limit the accessibility. Natural barriers can include the terrain or topography of the site as well as the vegetation. Physical barriers can include walls and fences that limit the public's accessibility to the sector. Both the physical and natural barriers found at a MRS are considered when evaluating this category. Site accessibility has three subcategories. These subcategories are presented in Table 6.3.

**Table 6.3**  
**Site Accessibility Subcategories**

<b>Subcategory</b>	<b>Accessibility Description</b>
No restriction to site	No man-made barriers, gently sloping terrain, no vegetation that restricts access, no water that restricts access
Limited restriction to access	Man-made barriers, vegetation that restricts access, water, snow or ice cover, and/or terrain restricts access
Complete restriction to access	All points of entry are controlled

6.1.2.2.3 **Site stability** relates to the probability of being exposed to MEC by natural processes. These natural processes include recurring natural events (e.g. erosion and frost heave) or extreme natural events (e.g., severe wind and flash floods). The local soil type, topography, climate, and vegetation affect stability of the site. The soil type and climate primarily affects the depth of penetration of the MEC. Over time, the soil type and climate will also affect the degree of erosion that takes place at a site. Topography and vegetation in the area will also affect the rate of erosion that takes place in an area. Site stability has three subcategories. Table 6.4 describes these subcategories.

**Table 6.4**  
**Site Stability Subcategories**

<b>Subcategory</b>	<b>Stability Description</b>
Stable site	MEC should not be exposed by natural events
Moderately stable site	MEC may be exposed by natural events
Site unstable	MEC most likely will be exposed by natural events

### 6.1.2.3 Human Factors

6.1.2.3.1 Two categories are evaluated in the primary human risk factor: activities and population.

6.1.2.3.2 The **activities conducted at a site** affect the likelihood of encountering MEC. The types of activities may be generally classified as recreational and occupational. This category examines whether the impact from an activity on MEC is significant, moderate, or low. To assign such a score, the general guidelines presented in Table 6.5 are considered. First, the type of activity is identified. Then, the depth of the activity is considered. For example, at a site where MEC is at the surface, all activities that can impact MEC at the surface are considered activities that have significant impact or contact level. Conversely, if all MEC is located at depths greater than 1 foot and only

surface impact activities are being performed, then the activities are considered as moderate or low impact. After the type of activity and depth of MEC are identified, then a score of significant, moderate, or low may be assigned. Given the absence of reliable and confirmed subsurface data at the SI stage, the subsurface category cannot be evaluated during the SI.

**Table 6.5**  
**MEC Contact Probability Levels**

<b>Examples of Activities</b>	<b>Actual Depth of MEC</b>	<b>Contact Level</b>
Child play, picnic, short cuts, hunting, hiking, jogging, ranching, surveying, off-road driving	Surface Below surface to 12 inches >12 inches	Significant Low Low
Camping, metal detecting	Surface Below surface to 12 inches >12 inches	Significant Moderate Low
Construction, archaeology	Surface Below surface to 12 inches >12 inches	Significant Significant Moderate

6.1.2.3.3 **Population** refers to the number of people that potentially access the MRS on a daily basis. A direct relationship exists between the number of people using the MRS and the risk of exposure. An estimate of the number of people accessing the MEC on a daily basis is made using best professional judgment based on knowledge of the type of site, land use, and site accessibility.

### **6.1.3 Application of Risk Evaluation Factors, Categories, and Subcategories**

#### **6.1.3.1 Evaluation of Presence of MEC Sources**

Based on the conditions observed during the SI field work and a review of historical aerial photography for the site as well as the INPR and PA, there is no reason to believe that MEC was ever used at the former Clovis AFB PBR No. 1. Therefore, there is no MEC presence.

#### **6.1.3.2 Evaluation of Site Characteristics**

All evidence for the former Clovis AFB PBR No. 1 suggests that the site was never used for its intended purpose and that MEC are not present at the site. Therefore, there cannot be a completed pathway with regard to MEC. Without the potential for a completed pathway, site accessibility and stability are immaterial. These factors have not been evaluated.



### **6.1.3.3 Evaluation of Human Factors**

As stated above, there is no potential for a completed pathway with regard to MEC at the former Clovis AFB PBR No. 1. Without the potential for a completed pathway, the activities conducted at the site and the number of people accessing the site are immaterial. Therefore, these factors have not been evaluated.

### **6.1.4 Hazards Assessment**

Each of the primary risk factors identified above was evaluated using the data collected during the SI field investigation and the historical data available from other studies. The risk evaluation for the MRS is presented in Table 6.6.

### **6.1.5 MEC Risk Summary**

No MEC or MD were observed during the SI field work in November 2006 or during any prior field visit (INPR, PA), and Clovis AFB PBR No. 1 is thought to never have been used as a bombing range. The absence of MEC/MD assures that the MEC exposure pathway is incomplete.

## **6.2 MUNITIONS CONSTITUENTS HUMAN HEALTH RISK SCREENING-LEVEL ASSESSMENT**

### **6.2.1 Conceptual Site Model**

Potential human receptors for Clovis AFB PBR No. 1 include the current and future on- and off-site residential population, current and future on- and off-site cattle ranchers, and current and future site visitors (e.g., recreational). The MC conceptual site exposure model (CSEM) identifies environmental media, potential transport mechanisms and exposure routes, and potential receptors (Appendix J).

### **6.2.2 Affected Media**

The TPP Team agreed that no soil, water, or sediment sampling was necessary because there is no known source of MC contamination. The TPP Team also agreed that if MEC or munitions-related debris were identified during the QR, the property would then move to the RI phase. The QR did not find MEC or munitions-related debris at the site.

### **6.2.3 Screening Values**

Screening values are not applicable because environmental media sampling has not been performed at this site.

### **6.2.4 Risk Characterization**

Human health exposure pathways are not complete at the site because MEC and/or munitions-related debris have not been found at the site.

**Table 6.6  
SI MEC Risk Evaluation**

<b>MRS</b>	<b>Presence of MEC Sources</b>					<b>Site Characteristics</b>		<b>Human Factors</b>	
	<b>Type</b>		<b>Sensitivity</b>	<b>Number of MEC Found</b>	<b>Number of MEC by Depth</b>	<b>Accessibility</b>	<b>Stability</b>	<b>Contact Level / Activities</b>	<b>Visitor Population (Daily)</b>
Clovis AFB PBR No. 1	No MEC are present on site	Not applicable	Not applicable	None	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

### **6.2.5 Discussion**

Without a source of contaminants, an exposure pathway is considered incomplete, and further human health risk assessment is not warranted.

## **6.3 MUNITIONS CONSTITUENTS SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT**

6.3.1 Potential ecological receptors include wildlife and sensitive environments. No wetlands or other sensitive environments are present on the site, and no sensitive vegetation has been identified. Although four T&E animal species (bald eagle, Northern Aplomado falcon, least tern, and black-footed ferret) have been identified in De Baca and Roosevelt Counties, their presence at Clovis AFB PBR No. 1 is unlikely because site conditions are unlikely to provide appropriate habitat for these species, as discussed below.

6.3.2 The bald eagle is a large predatory bird that feeds primarily on fish, but may also consume waterfowl, gulls, cormorants, and a variety of carrion. Bald eagles use large trees for nesting, perching, and roosting but may also use cliffs in the southwest U.S. (USFWS, 2006a). Based on this information, Clovis AFB PBR No. 1 does not have suitable habitat for bald eagles, although the species may migrate through the area.

6.3.3 The Northern Aplomado falcon is a subspecies of the Aplomado falcon that inhabits lowland neotropical savannas, coastal prairies, and higher-elevation grasslands from the southwestern U.S. south to Tierra del Fuego, Argentina. The northern subspecies prefers coastal prairies and desert grasslands with scattered yuccas and mesquites. Its diet is mostly birds and insects but also small mammals and reptiles. The northern subspecies was originally documented in the U.S. at six general localities in southeastern Arizona, south-central New Mexico, western Texas, and the lower Texas coast. It is currently found only in Texas, as well as Guatemala and Mexico (USFWS, 2007). Based on the historical distribution of the species, it is highly unlikely to occur at Clovis AFB PBR No. 1.

6.3.4 Least terns throughout North America nest in areas with similar habitat attributes. The riverine nesting areas of interior least terns are sparsely vegetated sand and gravel bars within a wide unobstructed river channel, or salt flats along lake shorelines. The interior least tern feeds on fish in shallow waters of rivers, streams, and lakes (USFWS, 2006b). The types of nesting and feeding habitats associated with this species were not observed at Clovis AFB PBR No. 1 site.

6.3.5 The black-footed ferret is one of the most endangered mammals in the U.S. It relies on prairie dogs as its primary prey and uses the prairie dog burrows for habitat. The species is considered extirpated in New Mexico, with the last confirmed report occurring in 1934 (NMDGF, 2006). Based on the historical distribution of the species, it is highly unlikely to occur at Clovis AFB PBR No. 1.

### **6.3.1 Conceptual Site Model**

There is no potential for adverse effects on ecological receptors due to contamination at the site as there is no source of MC contamination and a lack of receptors, as described above. Potential exposure pathways for ecological receptors are judged to be incomplete.

### **6.3.2 Management Goals**

The site is not currently managed for ecological purposes. There are no known ecological management goals for the site.

### **6.3.3 Affected Media**

Clovis AFB PBR No. 1 was never used by the DoD, and no MEC/MC have been found at the site. Therefore, available information indicates that there are no affected media.

### **6.3.4 Screening Values**

Screening values are not applicable because environmental media sampling has not been performed at this site.

### **6.3.5 Risk Characterization**

Ecological exposure pathways are not complete at the site because MEC/MC have not been found at the site.

### **6.3.6 Discussion**

Without a source or mechanism for release of contaminants, an exposure pathway is considered incomplete, and further ecological risk assessment is not warranted.

## **CHAPTER 7**

### **SUMMARY AND CONCLUSIONS**

#### **7.1 SUMMARY**

7.1.1 An SI was performed at Clovis AFB PBR No. 1 in Lea County, New Mexico to determine whether the site warrants further response action under CERCLA. The SI was completed by evaluating site-specific conditions that could impact the potential for complete exposure pathways to human and ecological receptors at the site.

7.1.2 Historical evidence and previous investigations indicate that Clovis AFB PBR No. 1 was never used. The technical approach for the SI, as established during the July 7, 2006 TPP meeting, focused on a QR strategy to support a systematic justification for an NDAI determination.

7.1.3 The SI evaluation included performing approximately 5.8 miles of walked QR on November 30, 2006. The QR did not find MEC at the site. None of the 28 QR observations indicated the presence of subsurface anomalies. No soil, sediment, or water samples were collected during the SI, as agreed by the TPP Team.

#### **7.2 CONCLUSIONS REGARDING POTENTIAL EXPOSURE PATHWAYS**

7.2.1 An exposure pathway is not considered to be completed unless all four of the following elements are present (EPA, 1989):

- A source and mechanism for chemical release;
- An environmental transport/exposure medium;
- A receptor exposure point; and
- A receptor and a likely route of exposure at the exposure point.

7.2.2 Based on all available evidence, the former Clovis AFB PBR was never used as intended, meaning that MEC were never present at the site. Therefore, there is no potential for a completed MEC pathway at the site. There are no known releases of MC to groundwater or soil at Clovis AFB PBR No. 1, and there is no potential for a release given the lack of MEC. Therefore, it is not expected that human or ecological receptors would be exposed to hazardous substances related to the single MRS at Clovis AFB PBR No. 1, based on the absence of MC and MEC. The present and anticipated future use of



## **DRAFT FINAL**

the site is as ranch land, primarily cattle grazing; therefore, no MC source will be present in the future. Without a source and mechanism for release, exposure pathways cannot be completed, and will not be completed in the future. Based on the evidence from the SI and previous investigations, no completed or potentially completed exposure pathways have been identified at Clovis AFB PBR No. 1, and risks to human health and the environment are not expected to occur.

**CHAPTER 8**  
**RECOMMENDATIONS**

An NDAI determination is recommended for this site. The basis for this recommendation is as follows:

- Clovis AFB PBR No. 1 is thought to have never been used as a bombing range, and no other historic military ordnance use at the site is known.
- No MEC, MC, or munitions-related debris have historically been identified at Clovis AFB PBR No. 1, and none were found during the SI site visit.
- Based on the above evidence, it is not believed that there are or ever were MEC or MC at this site.

## **CHAPTER 9**

### **REFERENCES**

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